

modating twelve students, as well as demonstrators' private room and laboratory.

On the roof there will be a small greenhouse with access from the junior laboratory.

The buildings will be lit throughout with electric light, and there will be electric bell and speaking-tube communication between the different private rooms, porter's room, and workshop.

The whole of the furniture and fittings have been designed by Professor Harvey Gibson and Mr. F. W. Dixon, the architect, so as to facilitate in every possible way the work both of students and teachers.

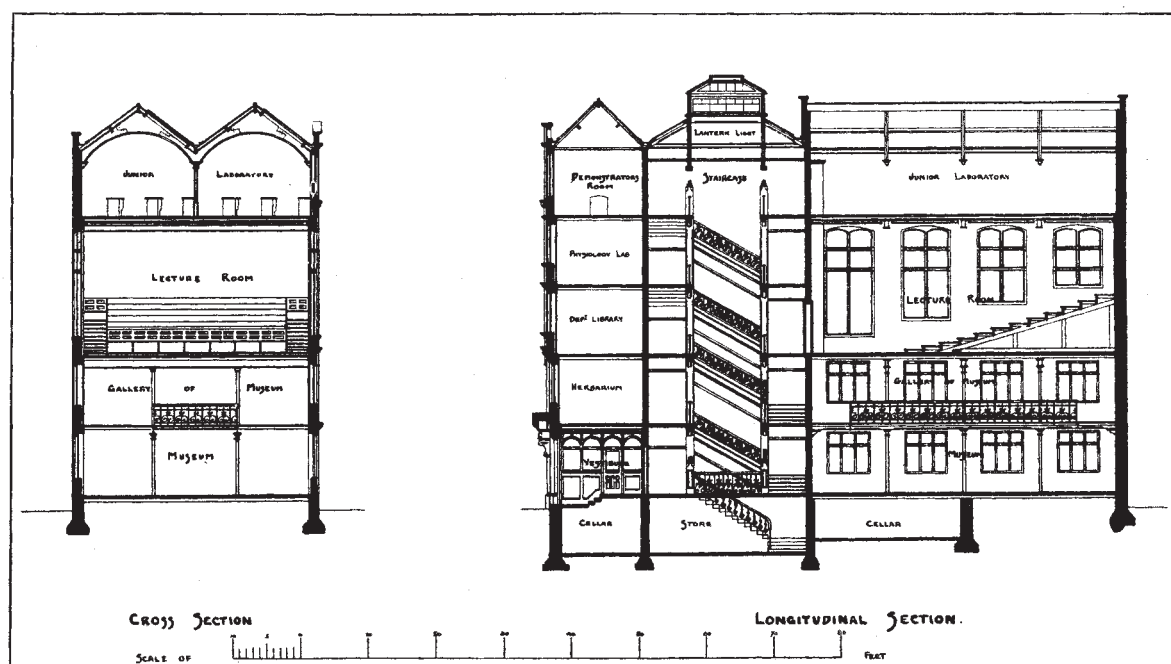
The furniture generally will be of pitch pine, and the cases of polished Canary wood. The staircase will have solid polished stone steps, and the walls will be plastered and painted. Externally the buildings will be faced with $2\frac{1}{4}$ -inch Ruabon brick with red sandstone dressings.

teachers. In this school, as in all others in this province, two hours' instruction weekly in fruit culture, gardening, and general farming during the last two years of the course is required. This has been compulsory by law since 1895. Outline suggestions for this work are sent the principal of the school by the provincial government, as follows:—

OUTLINE OF AGRICULTURAL COURSE IN THE HIGHER GRADES OF RURAL SCHOOLS IN THE GERMAN RHINE PROVINCE.

First Year.

April and May.—(1) Inner structure of plants; plant cells and tissues and their functions. (2) Outer divisions of plants: (a) The roots—their function in the nourishment of plants by the absorption of mineral matter, as phosphorus, potassium, sodium, iron, chlorine, and water; (b) the trunk—its branches



Hartley Botanical Laboratories, University College, Liverpool.

Altogether it may be said that Mr. Hartley's gift will provide University College, Liverpool, with a botanical laboratory worthy to stand alongside of the pathological and physiological laboratories, the recent splendid gift to the College of Mr. Thompson Yates. The building will be taken in hand immediately, and will, in all probability, be ready for occupation before the beginning of the autumn term of 1901.

SCHOOL GARDENS.

AS attention is being given to the question as to the subjects which should be taught in rural primary schools, and as the observation of living things under natural conditions is slowly coming to be regarded as an essential part of the education of a child in the country, a description of a course of instruction of this kind, given in a German elementary school, is of interest at the present time. Such an account, by Mr. C. B. Smith, has been published by the U. S. Department of Agriculture as *Circular No. 42*, and is here summarised.

The school is situated at Alfter, a village of some 2000 inhabitants, in the German Rhine Province, between Bonn and Cologne, and is what is known as a "people's school," which is equivalent to our public elementary school. Only the fundamental branches are taught in these schools, and the whole course is completed in eight years.

The Alfter common school contains 400 pupils and six

and buds, the structure of the cambium, and the occurrence of ring growths.

June.—(1) The leaf; the nature and function of chlorophyll in the life of the plant and the effect of light on chlorophyll development; breathing of plants; nourishment of plants from atmospheric constituents—carbon, nitrogen, oxygen. (2) The blossom and its fertilisation. (3) The fruit; seeds; reproduction of plants by seeds and by division of members.

July.—(1) The soil and its improvement—lime soil, clay soil, loams, sand. (2) The using up of plant food and its replacement by barnyard manure, compost, wood ashes, and indirect manures, as lime and gypsum. (3) Influence of the climate on plants.

August.—(A) Fruit culture. (1) Planting and nursery management of seedlings. (2) The most important methods of fruit improvement—root and stem grafting and budding with active and dormant buds. (3) Management of improved seedlings in the nursery—formation of the trunk and top; transplanting; handling of trained trees, especially espalier forms, with reference to their training against schoolhouse walls. (4) Culture of small fruits—gooseberries, currants, raspberries, strawberries and blackberries; setting grape-vines and their afterculture.

September.—(B) Fruit utilisation. (1) Ripening of the fruit; gathering, sorting, and storing winter fruits. (2) Fruit varieties—selection of the more commendable sorts with regard to their suitability to different climates and soils and at varying

altitudes. (3) Drying fruits; preserving; making fruit syrups; wine making. This work is planned especially for the girls.

October and November.—(C) Fruit-tree management. (1) Planting trees; pruning the roots and branches; watering newly-set trees and tying to stakes. (2) Care during the first year; top pruning. (3) Management of old trees—rejuvenating by pruning, grafting and scraping the bark. (4) Diseases of fruit trees and their prevention—knot growths, blights, gum excrecences, and frost injuries.

December.—(1) Enemies of fruit trees in the vegetable kingdom—mistletoe, mildew, lichens and moss. (2) Animal enemies of fruit trees—rabbit, mole, marmot.

January.—June bug; plum, apple and pear curculios; wasps; white butterfly; woolly aphis; and winter canker-worm.

February.—Minerals: soft coal; stone coal; petroleum; clay and its application in the manufacture of pottery and bricks; table salt.

March.—Iron, lead, copper, nickel, gold, silver; German coins.

April and May.—(1) Garden work—laying out plats, spading, manuring, sowing seed, watering plants, hoeing. (2) Vegetables—white and red cabbage, savoy cabbage, lettuce, spinach, carrots and onions.

June.—(1) Legumes—beans, peas. (2) Asparagus, cucumbers. (3) Utilisation of vegetables—drying, pickling, making into kraut and preserving. (4) Field work—plowing, harrowing, rolling.

July.—Field crops: (1) Cereals—rye, wheat, oats. (2) Potatoes, beets. (3) Fodder crops—clovers, grasses.

August.—(1) Necessity of crop rotation and consequent methods of manuring. (2) Weeds in garden and field and their eradication. (3) Animal enemies of plants and their control—field mice, phylloxera, asparagus fly, ground flea.

September.—(1) Cabbage butterfly, gooseberry measuring worm, pea weevil, army worm. (2) Useful insects: bees, ichneumon fly; useful mammals—mole, hedgehog.

October and November.—Plant enemies among the birds—swallow, nightingale, lark, robin, owls.

December.—Domestic animals—dogs, cattle, horses, chicken, doves.

January, February, and March.—Physiology of man.

The whole work of spading the soil, planting, seeding, cultivating, pruning and harvesting the crop in this garden, is done entirely by the boys of the sixth, seventh and eighth grades under the direction of the principal, who always works with them. Two hours a week are given to this work during the growing season and at such times as the conditions of the garden may require. About twenty boys work in the garden at one time, while the remainder of the pupils of the principal's room are having exercises in gymnastics. At the time of Mr. Smith's visit to this school a part of the pupils were sowing seed, others were covering them with soil to the required depth, while still others were laying out paths, picking off the dead leaves from flower stems, replanting beds, watering seeds already sown, &c. A few days later the fruits required attention; wall, espalier, and dwarf fruits require to be summer pruned, the fruits to be thinned, insects to be gathered and destroyed.

The children use the pruning shears and do the actual pruning, each pupil being given an opportunity to trim some portion of a tree; but no twig was allowed to be pruned until it was perfectly clear that that particular twig required pruning, and, indeed, to be pruned in a particular place which the pupil himself first determined upon. When it comes time for budding each pupil buds trees in the nursery. The fall pruning is always done by the children, and small fruits, vines and shrubs put in order for the winter by wrapping some with straw, laying others on the earth and covering, and the like.

The garden is intensively farmed and made a source of revenue. The same soil is utilised for two or three crops during the growing season and the produce sold. This gives the pupils an opportunity to learn what crops best form a succession with each other during the season, and also gives them practice in a limited way in preparing and putting up fruits, flowers, and vegetables for the market.

The principal is accustomed to walk through the garden each morning before school. Should he discover a harmful insect or disease, a specimen is immediately taken to the schoolroom and the nature and work of the injurious agent shown to the pupils and discussed. This enemy is especially hunted for during the

following work hour, and the children are asked to search the gardens at home for similar insects or diseases. Thus by daily association with the garden, daily watching for every new development and daily discussions and explanations, all the phenomena of the garden are encountered and brought to the attention of the pupils before the year's cycle is at an end.

Occasionally the bees are made the subject of a special lesson in apiculture. One morning a hive swarmed and flew by the school window, alighting on a small tree. The school was taken to observe this phenomena. The queen was found among the mass of clustering bees and was placed in the hive, the workers were gathered and placed with her, and a new colony was formed. Work in the apiary is incidental, but no opportunity is lost to make available anything of an especially instructive nature concerned therewith, and in the nature work the history of bees is considered.

So likewise flowering plants in the school windows are incidentally made a means of instruction. The principal's room contains three windows. These are filled with potted plants. The children (boys) are allowed to tend these flowers, to water them, guard them from insects, remove dead leaves and blossoms, and are permitted to have all the cuttings from the plants, either to take home for themselves or to plant in the school garden.

Very few of the schools in the Rhine province have such a practical course of agricultural instruction, the tendency being to confine the work to the schoolroom. This is the usual case in British schools, and only in a few districts is the school garden used as a means to interest pupils in nature and instruct them in some of the principles of husbandry.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The Smith's Prizes are awarded to Mr. J. F. Cameron, of Caius College, for an essay "On molecules considered as electric oscillators," and to Mr. R. W. H. T. Hudson, of St. John's College, for an essay on "Ordinary differential equations of the second order and their singular solutions." The names are in alphabetical order. Mr. Hudson was Senior Wrangler, and Mr. Cameron bracketed Second Wrangler in the Mathematical Tripos of 1898; and they were placed alone in the first division of the First Class in Part II. 1899.

Mr. J. H. Jeans, of Trinity College, has been elected to the Isaac Newton Studentship in astronomy and physical optics. Mr. Jeans was bracketed Second Wrangler in 1898.

The Council of the Senate report that the Benefaction Fund initiated by the Cambridge University Association now amounts to 55,430*l*. They suggest that of this sum 35,280*l*. should be appropriated to buildings for the departments of Botany, Law and Medicine, in addition to 8070*l*. specifically assigned to Law and Medicine by the donors.

Dr. J. N. Langley is to be appointed deputy-professor of Physiology for Sir Michael Foster, M.P., until Michaelmas 1901, at a stipend of 300*l*. a year.

Mr. F. G. Hopkins, University lecturer in Chemical Physiology, was admitted to the degree of M.A. *honoris causa* on March 1.

THE Council of Bedford College will in June next award an additional science scholarship, the "Henry Tate Scholarship," of the value of 50*l*. per annum for three years. This scholarship was endowed by the late Sir Henry Tate, and is to be for the first time awarded in science.

In answer to a question asked by Sir Michael Foster in the House of Commons on Thursday last, Sir J. Gorst said the Government is fully alive to the importance of scientific teaching in secondary schools, and will take care that nothing is done in the organisation of the Board of Education to impede its efficiency and progress.

THE policy of the Michigan State Agricultural College, a report upon which is included in the Report of the Michigan Board of Agriculture just received, is to educate youths and young women for the farm, and to give them such knowledge and inspiration along the various lines of agricultural work as will induce them to follow this calling after leaving the College. When the College was opened forty years ago, many students